

**Operationalizing Effects-Based Operations (An EBO Methodology
Based on Joint Doctrine)**

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Abstract

Adopting an effects-based approach for the conduct of military operations is central to the transformation efforts underway in America's armed forces. The effects-based approach, commonly referred to as Effects-Based Operations (EBO), is imbued with creative, critical thought processes and deliberate methodologies for planning, executing, and assessing operations that are designed to create the specific effects necessary to achieve national security objectives. It exploits lethal and non-lethal applications of force and applies to the full spectrum of missions from humanitarian relief to major combat operations. Moreover, it is applicable at all levels of decision-making; strategic, operational and tactical.

EBO allows military planners to avoid attrition and apply force at the right place and time to achieve specific effects. It redirects the focus of every action toward attaining the desired national security outcome rather than on the inputs to a force on force engagement, which is merely one of many alternative solutions. EBO optimally integrates all the elements of national power—diplomatic, economic, military, and information—in the planning and execution process and is as concerned with the state of the peace following military action as it is with victory itself. The “war” is not won until the desired political outcomes are achieved.¹

¹ Notes from an unpublished paper, M/Gen David Deptula, p. 1

Effects-Based Operations (EBO) are not new:

Effects-based operations are not new. Throughout history, decision-makers have sought to create conditions that would achieve their objectives and policy goals. Military commanders and planners have tried to plan and execute campaigns to create such favorable conditions--an approach that would be considered “effects-based” in today’s terminology. There are many historical examples. Sun Tzu advocated such an approach as the highest form of warfare when he wrote almost 2500 years ago “Those skilled in war subdue the enemy’s army without battle. They capture his cities without assaulting them and overthrow his state without protracted operations.”² Ulysses S. Grant used effects-based thinking during the Civil War, in combining actions to shatter the armies of Northern Virginia and Tennessee in combat, while simultaneously undertaking to isolate and destroy the major industrial and logistical bases that supported Confederate resistance. The US Army Air Corps (USAAC) Tactical School applied an effects-based approach to strategic bombing as early as the 1930s, spawning concepts and doctrine that had a major impact on Army Air Corps and Army Air Forces thinking throughout World War II.³ However, effects-based warfighting approaches have been applied only sporadically throughout history and, for a variety of reasons, have met with inconsistent success.⁴

Effects-based operations have been employed in every major conflict since the first Gulf war; however, effects-based warfighting approaches have been applied sporadically and, for a variety of reasons, met with marginal success. While Operations Allied Force, Enduring Freedom (OEF), and Iraqi Freedom (OIF) have illustrated the adoption of EBO concepts, Combatant Commanders use of EBO tenets has been inefficient and ineffective in planning, executing, and assessing their military campaigns.

As an example in Desert Storm power was one of the key target sets attacked in Iraq during Operation Desert Storm. Although the commander’s intent was to minimize the time it would take to regenerate the power plants, CENTAF target planners chose to attack the generator halls to ensure that they could not be brought back on line during the expected duration of the war. This caused unnecessary damage and inflicted hardships on the Iraqi people. The result was a slow, expensive rebuilding process and loss of support in the Coalition cause, especially in post-war Iraq. In fact, it can be argued that the excessive damage inflicted during Desert Storm hindered US efforts to restore power after the end of active hostilities in OIF.

During Operation Allied Force, it was determined that striking bridges across the Danube river in Serbia would restrict movement and re-supply of Serbian Army units in Kosovo. A number of bridges were attacked with spans being dropped. The direct effect was achieved. However, an unintended effect was the loss of commerce by Serbia’s neighbors, to include Hungary and Bulgaria who had supported the NATO action. This

2 Sun Tzu, *The Art of War*, Samuel B. Griffith (Ed.), New York: Oxford University Press, 1963, p.79.

3 Institute for Defense Analysis Joint Advanced Warfighting Program/J-7 (IDA/JWAP) briefing/unpublished paper, “New Perspectives on Effects-Based Operations,” p. 15-18.

4 ACC White Paper, Effects-based Operations, May 2002, p. 2

was a failure to analyze indirect and unattended effects. Similar examples exist in both OEF and OIF.

Nearly two thousand years after Sun Tzu, B.H. Liddell Hart expanded on Sun Tzu's idea by adding, "While such bloodless victories have been exceptional, *their rarity enhances rather than detracts from their value.*"⁵ To be sure, neither strategist suggests total abandonment of campaign options that may require armed conflict to achieve campaign objectives. What these strategists are arguing for is the active consideration of alternative means to achieve victory—those that may, with favorable settings, do so more swiftly, and with smaller payments in lives lost and goods expended. Simply put, when war is declared and forces are closing, rather than destruction being viewed as the *operative* means to inhibit enemy activity, it should be viewed as only *one of many* means to achieve control over an adversary. As demonstrated in OIF, EBO as a warfighting/war winning methodology does exactly that.⁶

EBO Methodology expands on and enhances existing Planning, Execution, and Assessment processes:

One reason for the lack of consistency in applying effects-based thinking to military operations is reflected in service and joint doctrine. Effects-based operations (EBO) are only discussed to a limited extent in US military doctrine today, and no methodology is offered to systematically apply it. For example, Joint Publication (JP) 3-0, Doctrine for Joint Operations, states that the levels of war (strategic, operational, and tactical) are doctrinal perspectives that clarify the linkages between strategic objectives and tactical actions. Furthermore, these levels are defined by their effect or contribution to achieving strategic, operational, or tactical objectives, but the methodology for applying or analyzing these linkages is not articulated.⁷

Objectives normally are derived from the objectives at the next higher level of war and may devolve from higher-level strategies. As the actual operation progresses, assessment of lower level results, or effects, suggests modifications to higher level strategies or objectives. Unfortunately, neither Air Force nor joint doctrine fully clarifies how and why effects relate to objectives and strategy. In fact, there is no definition for effects in joint doctrine and there is no approach or methodology which adequately captures why effects are important considerations, how they might be analyzed, and what they contribute to operations or attainment of objectives. The lack of such a methodology in doctrine explains why an effects-based approach to warfare has not been prevalent in military history. Fully articulating an EBO methodology would be extremely beneficial to military commanders in planning, executing and assessing campaigns.⁸

The EBO methodology is really a refinement or evolution of the objectives based planning methodology, see figure 1.0, that has been clearly and carefully incorporated in US military doctrine over the last decade by implementing a strategy-to-task approach for

5 Basil H. Liddell Hart, *Strategy*, (New York: Meridian, Penguin Books, 1991 [Second revised edition], p. 325,

6 Notes from an unpublished paper, M/Gen David Deptula, p. 2

7 Joint Pub 3-0, Doctrine for Joint Operations, 1 Feb 1995, ix.

8 ACC White Paper, Effects-based Operations, May 2002, p. 3

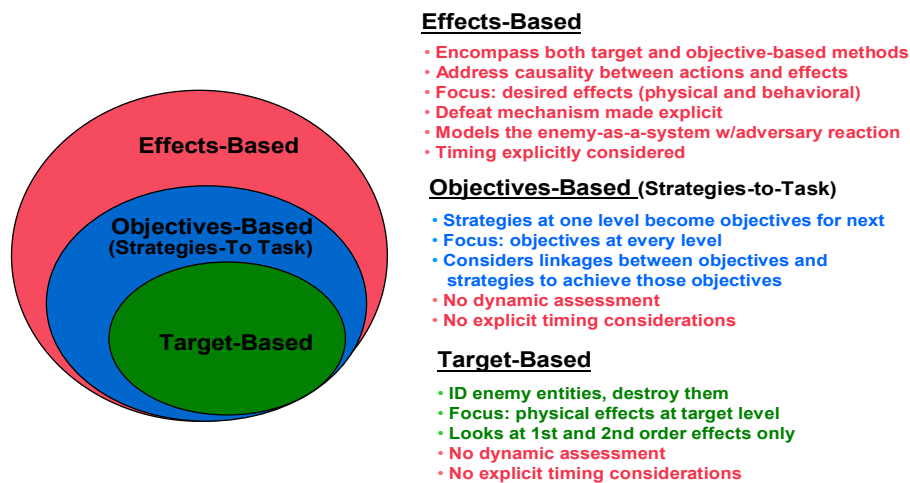


Figure 1 EBO Builds on Previous Planning Constructs

planning military operations.⁹ Objectives based methodology connects clearly-stated objectives to proposed actions and refines them to operational plans through the strategy-to-task approach. The EBO methodology takes the objectives based process a step further, allowing planners and commanders to examine conditions and causal linkages through which actions lead to objectives. There are routinely a number of different actions that can contribute to achieving these desired effects. “Causal linkages” explain *why* planners think the proposed actions will create desired effects. Formalizing the EBO methodology in doctrine will be the first step in developing an analytic methodology and planning processes to optimally achieve the desired national security objectives.

An EBO Planning Methodology based on Joint Doctrine (JP 3-30)

The planning portion of the EBO Methodology utilizes the JP 3-30 Joint Air Estimate Process (JAEP) as the framework. Although recently published, JP 3-30 includes a very limited number of references to implementing EBO. In fact throughout the entire publication the term “effects” is used five times and each is in reference to targeting, weaponizing, or munitions effects. However, we will use JAEP and highlight where the EBO Methodology differs from the procedures and techniques defined in JP 3-30. (See Attachment 1 for a tabular view of this discussion)

In the first step of JAEP, Mission Analysis, there are few changes to JP 3-30. There is a considerable amount of discussion concerning assessment (e.g. Intelligence Preparation of the Battlespace) however we will discuss this later in the assessment portion. When defining the specified, implied, and essential tasks (JFACC Objectives) that are included

⁹ ACC White Paper, Effects-based Operations, May 2002, p. 4

in the Joint Force Commanders guidance, the planners must also identify the desired effects associated with the objectives. In line with this, the team must define mission statement, commander's intent and desired end state using a EBO Lexicon.

The second step in JAEP, Course of Action (COA) Development, is probably the portion most impacted by implementing an EBO Methodology. Again the assessment discussions in this portion will be addressed later. During COA development Operational Objectives, Tactical Objectives, and Tactical Tasks are prioritized, sequenced, phased, and weight of effort is determined. Implementing EBO requires that those building COA options also determine:

- The Desired Effects (Direct & Indirect)
 - Why do I believe the actions taken will result in the desired effects?
 - Likelihood effects will attain Objectives (Why do I believe this?)
 - How will I know when effects are achieved (MOE)
 - What reaction do I expect from the enemy and why
 - What Indicators will identify success or failure in attaining the effect(s)
 - Why do I believe all of the above (rationale)
- Determine potential Unintended Effects
 - Likelihood of them occurring and why
 - Impact on JFACC/JFC Objectives (positive and negative)
 - If negative impacts how can they be avoided
 - How will I know if/when unintended effects occur with what Indicators
 - What risk is associated with the unintended effects? Is it acceptable?

The timing aspect of attaining the desired effects is provided by focusing the prioritization, sequencing, phasing, and weight of effort such as to attain them at the time, place and duration required. The refined Mission Statement and Commanders Intent produced in this step should use the EBO Lexicon.

The COA Analysis, COA Comparison and COA Selection steps of JAEP differ slightly under the EBO Methodology. However, the EBO Methodology does provide a considerable amount of expanded data and information that directly leads to providing the commander with actionable decision level inputs. As an example, in COA Analysis under the EBO Methodology previously developed items such as; desired effects, timing, predicting enemy reactions, unintended effects, rationale for the decisions made, etc will greatly add to the analysis capabilities. EBO also provides the ability to build a timeline that identifies when certain objectives, tasks (actions) and effects are projected to occur. In addition, EBO provides the conceptual development of linkage for all of these items to support a timely & accurate analysis.

The last step in JAEP, the production of the Joint Air Operations Plan (JAOP) provides the planners implementing EBO an excellent opportunity to provide expanded information to those executing the plan. As an example the Concept of Operations and the Phase Directives generated in the JAOP are an excellent opportunity to use EBO Lexicon and organize all of the previous efforts into a coherent representation. In so

doing the planners can highlight the desired effects, linkage to tasks/objectives and especially the rationale behind the decisions made in the process. In addition the Indicators are a good start for better defining the Commanders Critical Information Requirements (CCIR) and providing increased focus for ISR tasking. Using the EBO Lexicon to develop the Air Operations Directive is another excellent chance to continue the linkage from the COA through to those developing the Master Air Attack Plan (MAAP). The MAAP must also provide EBO related information such as;

- What do we want the enemy to do?
- What part of the enemy must we effect to make them do it?
- What reaction do we anticipate and why do we think this?
- What objectives are we supporting and how does this accomplish them?
- Why do we want to achieve them (effects and objectives)?
- Where and when and to what degree do we need to attain the desired effects?

A serious question that must be addressed in the future is how do the planners pass on the amount and type of information required to those executing the plan so as the desired effects are achieved?

An EBO Execution Methodology enables Dynamic Operations

Operation Iraqi Freedom has been characterized as representing the future with expanded breadth and depth of operations supported by an increased operations tempo all in support of EBO. In order to execute such operations, those executing the plan must have an in-depth understanding of the planned effects equal to that of those who planned it. The present day system does not provide the required information to execute EBO. In the recent past there have been several instances where those executing did not fully understand why they were attacking a particular target, vice another in the same complex. As a result they changed targets which resulted in undesired effects. Either the system must provide those executing with all of the relevant information or it must provide them the means with which to request and receive the information in a timely manner.

An example of this type of dynamic is depicted in the USAF Air Operations Center (AOC) CONOPS dated 9 March 2001. It is interesting to note the depiction identifies “effects” as the glue that binds the different components making up dynamic execution. (See Figure 2)

As depicted in Figure 2, achieving desired effects requires timely and continuous collaboration and fused information exchange. Battlespace Awareness, in a Common Operational Picture (COP) for example, combines information from air, surface, subsurface, ground, and space assets to provide a three-dimensional view of the battlespace. Sensor and data fusion within this picture plays an important role in validating targets and eliminating ambiguous information. Horizontal/vertical integration requires all participants to comprehend essential details of the overall daily plan, synchronization, schemes of maneuver, and a sense of the theater battle rhythm. Changes must be communicated horizontally (i.e. to the planners and sister components), and vertically (to units and HHQ). Continuous assessment often reveals a “trigger event,”

launching the dynamic events process. Dynamic events include those events that are not planned, not anticipated, or are planned with incomplete information. These types of events trigger planning processes and activities outside or in addition to normal operations.¹⁰ This depiction of dynamic execution highlights the requirement for those executing the plan to build and maintain an in-depth understanding of the desired effects.

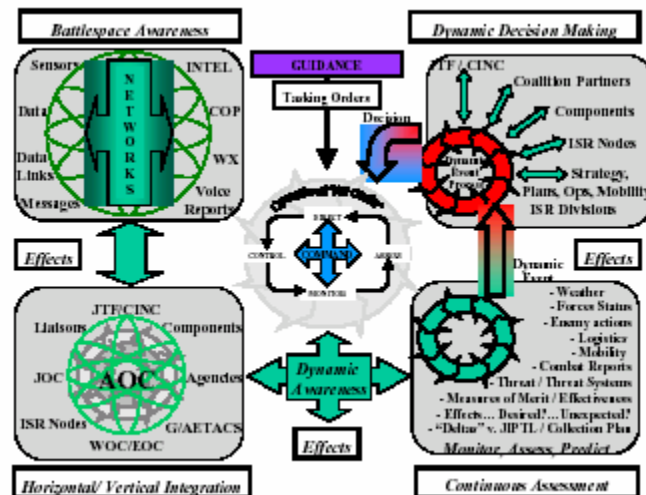


Figure 2 Dynamic Execution Processes

Another important aspect of execution is that measurable indicators pointing to the success or failure of attaining the desired effects at the projected time be provided. Executing EBO requires that we not only provide indicators for success, but also those associated with highlighting when we have failed to attain the desired effects as well as indicators if unintended effects. These aspects along with a deep understanding of the scenario around which the plan was developed are critical to providing ISR with the proper focus to collect against. In addition, these indicators must be characterized in the Measure of Effect associated with each desired effect.

An EBO Methodology through Effects-based Assessment (EBA) provide actionable information

Assessment is an on-going process that supports both deliberate and crisis action planning. Just as EBO transcends all levels of operations from strategic, through operational to tactical, Effects-based Assessment also does so. Because military actions are two sided, Effects-based Assessment must not only be accomplished from the perspective of the friendly forces, but also from the perspective of the adversary. To effectively implement EBO, one must view the environment from both sides of the problem. One must not only think about what they want to accomplish, but also what the adversary wants to accomplish and how one goes about attaining the desired effect on the adversary so the adversary does what you want, when you want, etc. Successfully attaining this ability to think like the adversary is one of the more difficult aspects

¹⁰ USAF Air Operations Center Concept of Operations, 9 March 2001, p 13-19

associated with implementing EBO. One must be able to view the world through the adversary's eyes, think like they think, predict how they will act and/or react to our actions, etc.

The first step of JAEP includes IPB. Present analysis of enemy capabilities supporting IPB is routinely based on analyzing their systems, their training, their employment doctrine, their potential COAs, etc. In order to implement EBO, one must not only analyze the enemy as an enterprise which includes the physical and non-physical aspects, but it must also be accomplished from the perspective of the enemy. We need to add to assessment and provide the capability to think like the adversary thinks, reason like the adversary does, see the world through the adversary's eye's, and act like the adversary would act in given situations, etc. When we perform the analysis for each Center-of-Gravity, we must do so not only from our point of view, but from that of the adversary as well. When we identify potential adversary COGs, this must be done from their point of view, not where we think they are most vulnerable. In addition, when analyzing Friendly COGs, we must do so from the perspective of the enemy, and realize what desired effects they may want to attain.

Once actions have begun, assessment plays an even more critical role in the implementation of the EBO Methodology. At the strategic level there exists a requirement that intra-agency information be provided and horizontal integration become a reality. Without this any one such node, as an example the CAOC, not enough access to information exists in sufficient amounts to build a complete picture of the enemy. As we previously stated, we are not describing predictions of mathematical certainty. But we are defining a requirement that the system provide the commander with timely, actionable, decision making information.

Throughout the lessons learned collected after the last years of military operations it has been repeatedly stated that the existing assessment process does not meet the warfighters' need for actionable assessments across the full spectrum of operations. Of significant concern is that these practices are not adaptable to the complexity of a dynamic and evolving hyper-ops-tempo that supports EBO. The traditional means of assessment are not capable of supporting a transition to full EBO. Present day assessment maintains deficiencies in doctrine; Tactics; Techniques and Procedures (TTPs); attrition-based focus; serial and rigid processing; bean counting compartmentalized data; and as a result breaks the close linkage required between planning, execution and assessment to implement EBO.


An Effects-based Assessment Methodology must not only provide the commander with information on the status of the operations, but sufficient enough to recommend future actions. The tactical level assessment must include the effects generated by both kinetic and non-kinetic actions. This level of assessment must be accomplished in regards to how well the actions and the resulting effects support the accomplishment of the tactical objectives. These must then be aggregated up and fed into the assessment at the operational level. At the operational level, using the projections from IPB, EBA analyzes internal and external factors effecting both friendly and enemy forces. Assessing tactical

level results against operational objectives EBA predicts enemy re-actions and related adjustments to future plans.

In order to accomplish this EBA requires the rationale behind predictions associated with attaining desired effects be captured and linked to the actions taken. In addition, assessment must be capable of identifying when unintended effects are happening with equal accuracy as to when desired effects are occurring. Effects-based assessment also tends to drive the assessment process away from the traditional physical and munitions to a more functional focus. Re-targeting recommendations within EBO are based on achieving the desired effects vice more bombs on target.

In order to transition from the present day Battle Damage Assessment process to those associated with Effects-based Assessment, it will require not only changes in the processes, but will also require the leveraging of new concepts and technology.

EBO leverages new concepts (e.g. NCW, Parallel Warfare, Information Superiority, etc.) and technology (e.g. Cognitive Analysis, Precision Attack):

Commanders require timely, pertinent, and accurate actionable information. A close and continuous interaction between Combat Assessment, Intelligence Preparation of the battlespace (IPB), and Intelligence, Surveillance, and Reconnaissance (ISR)  is required to provide such actionable information. Total knowledge of the adversary is not a prerequisite to implement the EBO methodology. However, over time the impact of the EBO methodology can be enhanced with investment in the right kinds of command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) equipment and architecture. The benefits of anticipatory assessment, predictive battlespace analysis, and effects analysis, cannot be overstated. With the right kind of information collection capability, linked with commanders, analysts, planners and operators to provide near-real-time fusion and dissemination of a common relevant operating picture to everyone who needs it, the power of the EBO methodology is significantly enhanced.¹¹

NCW is about human and organizational behavior. NCW is based on a new way of thinking, network-centric thinking, and applying it to military operations. NCW focuses on the combat power that can be generated from the effective linking or networking of the warfighting enterprise. It is characterized by the ability of geographically dispersed forces to create a high level of shared battle space awareness that can be exploited via self-synchronization and other network-centric operations to achieve commander's intent. NCW supports speed of command, the conversion of a superior information position to action. NCW is transparent to mission, force size, and geography. Furthermore, NCW has the potential to contribute to the coalescence of the tactical, operational, and strategic levels of war. In brief, NCW is not narrowly about technology, but broadly about an emerging military response to the Information Age.¹² In regards the connectivity

¹¹ ACC White Paper, Effects-based Operations, May 2002, p. 16

¹² David Alberts, John Garstka, and Frederick Stein. *Network Centric Warfare, Developing and Leveraging Information Superiority*. Washington, DC; CCRP. 2000.

between NCW and EBO “Network Centric Warfare, the concept of linking all aspects of warfighting into shared situation awareness and shared understanding of command intent so as to achieve a unity and synchronicity of effects that multiplies the power of military forces”.¹³

The common thread that runs through the definition of Network Centric Warfare, the introduction of new technologies, and the exploration of a concept of effects-based warfare is the search for greater combat efficiency. That is, the purpose of each technology and concept is a reduction in the relative amount of military or other power needed to undertake a given mission, to fulfill a given task, or to create a specific outcome. The attraction of Network Centric Warfare and effects-based warfare is the prospect that they can yield improved combat efficiency. The challenge is to understand how they might do this and what combination of technologies used in support of which concepts would yield the greatest combat efficiency.¹⁴

Melding sensor, intelligence and operational data has allowed coalition forces to move at unprecedented speeds with greater firepower, smaller forces, and larger effects. However, unless NCW is directly linked to an effects-based methodology the synergies of timely intelligence, available firepower and the will to use them will provide limited strategic impact.

Modeling and simulation (M&S) tools are required to enhance the EBO methodology. Most current modeling tools (such as TACWAR, CBS, AWSIM, and JTLS) are based on algorithmic attrition models, which cannot model the effects that are critical to this methodology. In terms of supporting EBO, there are two basic aspects to M&S. First are physical systems and their interconnections (e.g., POL, electricity and transportation). As we study and learn to better understand these types of systems and their interconnections, algorithmic M&S tools will also become more sophisticated and allow modeling of functional and systemic effects with satisfactory precision. For those systems where human decision-makers play key roles (e.g., national leadership, military command and control, etc.), however, a fundamental change in approach to M&S is necessary. No matter how sophisticated M&S becomes, however, there is no time in the near future when it can be expected to accurately model complex strategic or psychological effects. Modeling such complex effects will require development of non-algorithmic models, incorporating human judgment for some applications. It will also require great reliance on operational art and the professional judgment of senior operational leaders. M&S technology can provide some answers if it is properly focused and centrally managed to attack the problems of effects simulation and analysis.¹⁵

As EBO takes us away from warfare based on attrition and annihilation, we focus on taking the required actions that shape the enemies reactions along with our having the capability to understand that our actions did in fact cause the enemy reaction. In order to

¹³ Edward A. Smith, “Effects Based Operations Applying Network Centric Warfare in Peace, Crisis and War”, DoD Command and Control Research Program Paper, Nov 2002, p 61

¹⁴ Ibid, p 63

¹⁵ ACC White Paper, Effects-based Operations, May 2002, p. 24

effect the perceptions of those we target and get them to decide and react the way we want, it will require that we develop a much better understanding of cognitive processes. We are not talking about the direct or indirect physical effects of our actions. Nor are we talking about using Information Warfare and NCW to simply manipulate information. We must develop the capabilities to understand the cumulative effects of our actions, both physical and information, on the decision making processes of those we target. In addition, we must also be able to develop a similar capability for projecting the reactions of neutrals (e.g. the French, German and Russian reactions to OIF).

Although promising, fully implementing the EBO methodology will not be easy. Perhaps most challenging are the needs for anticipatory assessment and high-order analysis. Perfect anticipatory assessment and high-order analysis, cannot be allowed to become the enemy of the good-enough assessment and analysis. The EBO methodology is not totally dependent upon these two functions and they will never be done perfectly. In fact, just doing them reasonably well will be a significant challenge requiring extensive conceptual development, years of education and training, reorganization of many planning and assessment functions, and development and application of advanced technologies of many kinds. Although technological progress will continue to enable critical aspects of EBO, the institutionalized mindset of the commanders, planners, operators, and assessors employing the technology is the most important factor in implementing the EBO methodology.¹⁶

¹⁶ ACC White Paper, Effects-based Operations, May 2002, p. 24

Attachment 1

JP 3-30 *WITH EBO*

(THIS DEPICTION IS BASED ON AND IS VERY SIMILAR TO ONE THAT HAS BEEN DEVELOPED FOR AND USED IN JEFX 04)

1.	Mission Analysis			X	
1.1	Receive JFC Mission and Guidance			X	
1.1.1	Look for and re-define JFC statements in effects-based terms		X	X	
1.2	List facts and assumptions			X	
1.2.1	Consider JFC statements as facts and add own assumptions to fill in knowledge gaps so planning can continue			X	
1.3	Conduct IPB (First pillar of PBA)			X	
1.3.1	Analyze JFC-defined battlespace environment			X	
1.3.2	Describe battlespace effects on friendly and adversary units			X	
1.3.3	Evaluate Friendly Forces assigned			X	
1.3.3.1	Identify Friendly COGs			X	
1.3.3.2	Recommend requests for additional forces as appropriate			X	
1.3.3.3	Develop FroB			X	
1.3.4	Evaluate Adversary			X	
1.3.4.1	Identify Adversary COGs			X	
1.3.4.2	Analyze Adversary as a System (Strategic Environ Research)	X			
1.3.4.3	Conduct Target Development (second pillar of PBA)			X	
1.3.4.4	Develop EOB (determine current adversary situation)			X	
1.3.4.5	Identify Adversary Capabilities			X	
1.3.5	Identify most likely and most dangerous enemy courses of action	X			
1.4	Determine Specified Implied and Essential Tasks			X	
1.5	Identify additional resources required			X	
1.5.1	Begin logistics feasibility analysis			X	
1.6	Write Mission Statement			X	
1.6.1	Use effects-based language as appropriate		X		
1.7	Write commander's intent			X	
1.7.1	Use effects-based language as appropriate		X		
1.8	Identify end state			X	
1.8.1	Identify the conditions under which US military involvement will cease			X	
1.8.2	In some cases, the JFC uses effects-based language to describe the end state		X		
2.	Situation and Course of Action (COA) Development			X	
2.1	Refine IPB based on products from Mission Analysis			X	
2.2	Analyzing and Identify Friendly and Adversary COGs (COG-Critical Capabilities - Critical Requirements – Critical Vulnerabilities)			X	
2.2.1	Utilize System Analysis techniques to analyze friendly and enemy COGs			X	
2.2.2.1	Analyze Friendly and Adversary Physical COGs (e.g. fielded forces, infrastructures, etc.)			X	
2.2.2.2	Analyze Friendly and Adversary Non-Physical COGs (e.g. Moral, Political, Cognitive Decision Processes, etc.)		X	X	
2.3	Identify critical adversary and friendly vulnerabilities			X	

2.3.1	Develop adversary vulnerabilities into specific targets			X	
2.3.2	Develop friendly vulnerabilities into critical asset lists			X	
2.4	Develop Adversary COAs (Identify most dangerous and most likely)			X	
2.5	Develop Friendly COAs (as many as the JFACC desires)			X	
2.5.1	Determine objectives that will accomplish the JFACC's mission and support the JFC's objectives (operational objectives)			X	
2.5.2	Determine desired effects (direct and indirect) that will achieve operational objectives identified in 2.5.1		X		
<i>Why do I believe these effects will attain the operational objectives?</i>					X
2.5.2.1	Assess the likelihood of the desired effects attaining the objective. This requires an understanding of the cause and effect relationship.		X		
<i>How will these effects support attaining the objectives?</i>					X
2.5.2.2	Recommend success indicators (MOEs) that will aid in assessment of desired effects (ISR Strategy and planning—third pillar of PBA)		X		
<i>How will I know these effects have been achieved?</i>					X
2.5.3	Determine potential unintended effects		X		
<i>Why do I believe these effects will occur?</i>					X
2.5.3.1	Assess the likelihood of all unintended effects occurring?		X		
2.5.3.2	Assess the impact, or value, of the unintended effects with respect to the JFACC's and the JFC's objectives		X		
<i>Will these other effects add to or subtract from accomplishing the objectives?</i>					X
2.5.3.3	In cases where the impact is counterproductive, recommend actions that might mitigate the risk of undesired effects		X		
<i>How can I avoid undesired effects? Can I modify the action or take some other action in addition to the original action?</i>					X
2.5.3.4	Recommend indicators that will aid in assessment of unintended effects (ISR Strategy and planning—third pillar of PBA)		X		
<i>How will I know when unintended effects have occurred?</i>					X
2.5.4	Determine the tactical objectives that will accomplish operational objectives			X	
2.5.5	Determine desired effects (direct and indirect) that will achieve objectives identified in 2.5.4		X		
<i>Why do I believe these effects will attain the tactical objectives?</i>					X
2.5.5.1	Assess the likelihood of the desired effects attaining the objective. This requires an understanding of the cause and effect relationship.		X		
<i>How will these effects support attaining the objectives?</i>					X
2.5.5.2	Recommend success indicators (MOEs) that will aid in assessment of desired effects (ISR Strategy and planning—third pillar of PBA)		X		
<i>How will I know these effects have been achieved?</i>					X
2.5.6	Determine potential unintended effects		X		
<i>Why do I believe these effects will occur?</i>					X
2.5.6.1	Assess the likelihood of all unintended effects occurring		X		
2.5.6.2	Assess the impact, or value, of the unintended effects with respect to the JFACC's and the JFC's objectives		X		
<i>Will these other effects add to or subtract from accomplishing the objectives?</i>					X
2.5.6.3	In cases where the impact is counterproductive, recommend actions that might mitigate the risk of undesired effects		X		

How can I avoid undesired effects? Can I modify the action or take some other action in addition to the original action?

- 2.5.6.4 Recommend indicators that will aid in assessment of unintended effects (ISR Strategy and planning—third pillar of PBA)

How will I know when unintended effects have occurred?

- 2.5.7 Determine the Tactical Tasks (actions that will accomplish the Desired Effects)

Why do I believe these actions will result in the desired effects?

- 2.5.7.1 Assess the likelihood and timeliness of each Action achieving the Desired Effect. This requires an in-depth understanding of the cause and effect relationship (causal linkage)

How will the actions support achieving these effects?

- 2.5.7.2 Recommend success indicators (MOEs) that will aid in assessing the actions resulting in the desired effects

How will I know these effects have been achieved?

- 2.5.8 Determine potential Unintended Effects that each Action may also cause

Why do I believe these other effects will occur?

- 2.5.8.1 Assess the likelihood of all unintended effects occurring
2.5.8.2 Assess the impact, or value, of the unintended effects with respect to the JFACC's and the JFC's objectives

Will these other effects add to or subtract from attaining the objectives?

- 2.5.8.3 In cases where the impact is counterproductive, recommend actions that might mitigate the risk of Undesired Effects

How can I avoid undesired effects? Can I modify the action or take some other action in addition to the original action?

- 2.5.8.4 Recommend indicators that will aid in assessment of Unintended Effects

How will I know when unintended effects have occurred?

- 2.5.9 Determine supporting actions/tasks
2.5.10 Refine COAs based on priority, sequence, phasing, weight of effort, and matched resources
2.5.11 Ensure Phases (and objectives) support JFC phasing, objectives, and end state
2.5.12 Sequence Tasks (Actions) to accomplish objectives and to achieve Desired Effects while mitigating risk of undesired effects
2.5.12.1 Vary objective and task/action priority, sequencing, phasing, weights of effort, and resources to create different COAs
2.5.12.1.1 Group Actions that correspond to Effects (either JFC's and/or JFACC's) to create phases. Typically phases link desired objectives or effects by time.
2.5.12.2 Identify risk areas for each COA based on the probabilities of not achieving Desired Effects and of achieving Undesired Effects

- 2.6 Determine validity of COAs based on suitability, feasibility, acceptability, distinguishability, and completeness

- 2.7 Refine the Mission Statement and Commander's Intent (based on the risk, timeliness, and indicators determined during COA development) to better

			X
	X		
			X
	X	X	
			X
	X		
			X
	X		
			X
	X		
			X
	X		
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	X		
			X
		X	
		X	
	X	X	
	X	X	
	X		
	X		
		X	
	X	X	

- communicate the Desired Effects, the Undesired Effects, and the risk mitigation Actions
3. COA Analysis
 - 3.1 Wargame each COA against the adversary's most likely and most dangerous COAs
 - 3.1.1 Consider all facts and assumptions of the estimate and their possible effect on the action
 - Do the assumptions have any impact on attaining the desired effects?*
 - 3.1.2 Consider conflict termination issues. Think through own action, adversary reaction, and counteraction.
 - 3.1.3 Assess the likelihood of achieving objectives and desired effects given likely enemy reactions (Look at the World through the eyes of the adversary)
 - If I achieve the desired effect, how will the enemy respond? How likely is this reaction? How will I know? Will it add to or subtract from my objective? If unintended effects occur, how might the enemy respond? How likely is this reaction, given the unintended effects? How will I know? How will allies/coalition partners respond? Why do I believe all of the above?*
 - 3.1.3.1 Recommend changes that enhance the COA
 - 3.1.3.2 Create sequel plans that allow friendly forces to capitalize on achievement of objectives and desired effects
 - 3.1.4 Assess the likelihood of Undesired Effects occurring given the likely enemy reactions
 - How might the enemy act to produce Undesired Effects?*
 - 3.1.4.1 Recommend changes that mitigate the risk of causing undesired effects
 - Have I considered the consequences of all known Undesired Effects?*
 - 3.1.4.2 Create basic branch plans that address enemy reactions and mitigate risks of unintended and undesired effects
 - 3.2 Identify advantages and disadvantages of each COA based on wargaming
 - 3.3 Refine each COA based on COA wargaming
 - 3.3.1 Modify each COA based on enemy's most likely and most dangerous reactions based on recommendations from steps 3.1.1.1 and 3.1.2.1 and add sequel and branch plans from steps 3.1.1.2 and 3.1.2.2.
 - 3.3.2 Validate FrOB based on COA wargaming--if better results could be achieved with a different force mix, recommend such a FrOB. Rank resources according to expected contributions of friendly and adversary forces to achieving desired effects with less risk of failure or greater probability of success
 4. COA Comparison
 - 4.1 Determine comparison criteria
 - 4.1.1 Criteria usually will be determined by the JFACC, but suggested criteria include risk (of success and of failure), timeliness, and observability
 - 4.2 Rate each COA against criteria
 - 4.3 Compare each COA against the others based on rating
 - 4.4 Recommend highest-rated COA

Is there any reason why I should choose a lower-rated COA? If so, there may be other comparison criteria that should be considered.

		X	
		X	
		X	
			X
		X	
	X	X	
			X
		X	
	X	X	
			X
		X	
		X	
		X	
	X	X	
		X	
		X	
		X	
			X

5.	COA Selection			X	
5.1	Present COA comparison and recommendation to JFACC for decision			X	
5.1.1	Present COA phasing, desired and undesired effects , risks (of success and of failure), and indicators of success and failure		X	X	
5.1.2	Include recommendations for different force mix and deployment developed in Step 3.3.2		X	X	
5.2	Refine COA based on JFACC decision and guidance			X	
5.3	Present recommended COA to JFC for approval			X	
5.3.1	Include recommended changes to FrOB			X	
5.4	Refine COA based on JFC guidance			X	
6.	Joint Air Operations Plan Development			X	
6.1	Situation (Insert the products from Steps 1.3 and 2.1-2.4)			X	
6.1.1	Update previous Enemy Forces analysis (e.g. Objectives, COGs, etc.) must update and continue the systems level analysis of the adversary previously accomplished		X	X	
6.1.2	Friendly Forces (JP 3-30 calls for those that are not assigned or attached) to include how they may or may not contribute to attaining the desired effects		X	X	
6.1.3	Assumptions – Specified and Implied (how do they impact attaining desired effects)		X	X	
6.2	Mission		X	X	
6.2.1	Provide a summary of directives, letters of instructions, memorandums, treaties, and strategic plans, including any campaign/operation plans received from higher authority that apply to the plan and how they impact attaining the desired effects		X	X	
6.2.2	State the Joint Air Tasks, their purposes, and relationships in regard their supporting the JFC Objectives. State how JFACC desired effects support the JFC desired effects/end-state.		X	X	
6.2.3	Provide applicable guidance, including desired effects (e.g. desired end-state, commanders intent, mission statement using effects-based lexicon)		X	X	
6.2.4	Provide constraints and restraints and their impact on attaining the desired effects		X	X	
6.3	Air Operations			X	
6.3.1	State the commander's intent derived during the planning process. Intent should be a clear, concise statement of what the force must do to succeed with respect to the adversary to reach the desired end state and the desired effects that support that		X	X	
6.3.2	Provide a Concept of Operations. State the broad concept for the employment of major air capable joint forces during the operation or campaign as a whole (e.g. Joint force air organization, Basing overview, Operational missions, Phases of joint air operations in relation to JFC operation or campaign plan, Objectives for each phase, Sub-objectives and tasks for each phase, MOEs for each sub-objective/task, Timing and duration of phases, and related desired effects, etc.)		X	X	
6.3.3	Provide a Phase Directive for each phase that includes a fairly detailed plan for executing the phase including preliminary sortie allocation, Operational Objectives, Tactical Objectives, Tactical Tasks, and MOE for the phase as well as timing and sequencing of objectives. Also to show how joint air operations support I/O and how these all tie into attaining the desired effects.		X	X	
6.3.4	Provide coordinating instructions for those areas that are applicable to two or more phases of the plan.			X	
6.4	Logistics			X	

- 6.4.1 Include the FrOB as developed in 1.3.3.2 and as modified following
step 5.3.1
- 6.5 Command, Control, and Communications

		X	
		X	

Attachment 2

Glossary of Effects Terminology (Taken for the Air Combat Command EBO White Paper)

2nd, 3rd, nth Order Effects. a causes b causes c causes. . .For example, disruptions in the electric grid. . .yields rolling blackouts. . .which disrupt petroleum deliveries to airfields...which disrupt air operations.

Cascading Effects. An indirect effect that ripples through an adversary system, often affecting other systems. Typically, a cascading effect flows from higher-to-lower levels of employment and is the result of influencing nodes that are critical to multiple adversary systems.

Causal Linkage. Explanation for how a particular action contributes or leads to a given effect. It answers the question, “why do planners believe this action will create or help create the desired effect?”

Collateral Effects. Outcomes that result when something occurs other than what was intended. These outcomes may be either positive or negative to the original intent. In one sense, collateral effects may be the incidental direct or indirect effects (usually unintentional) that cause injury or damage to persons, objects or systems. In a broader perspective collateral effects cover a wide array of possible downstream results.

Cumulative Effects. The aggregate result of many direct or indirect effects against an adversary. Typically, a cumulative effect flows from lower-to-higher levels of employment and occur at the higher levels; however, it may occur at the same level as a contributing lower-order effect.

Direct Effects. Immediate, first-order effects (e.g., weapons employment results). They are the results of actions with no intervening effect or mechanism between act and outcome.

Effects. A full range of outcomes, events or consequences that result from a specific action.

Effects-Based. Action taken with the intent to produce a distinctive and desired effect.

Effects-Based Operations. Actions taken against enemy systems designed to achieve specific effects that contribute directly to desired military and political outcomes.

Effects-Based Operations Methodology. A methodology for planning, executing, and assessing operations designed to attain the effects required to achieve desired national security outcomes.

Functional Effects. Direct or indirect effects of an attack or operation on the ability of a target to function properly. In essence, it answers the question, to what extent has the function of the target been degraded or affected by those actions.

Indirect Effects. Those effects, which are created through an intermediate effect or mechanism, producing a final outcome or result. They are 2nd, 3rd and nth order effects, which may be functional, systemic or psychological in nature. Indirect effects tend to be delayed and typically are more difficult to recognize than direct effects.

Operational Effect. The link between tactical results and strategy; typically, the cumulative outcome of missions, engagements and battles. An operational effect also may result from the disruption of systems or areas of operational value.

Physical Effects. Effects created by the direct impact through physical alteration on the object or system targeted by the application of military action.

Psychological Effects. The results of actions that influence emotions, motives, objective reasoning and ultimately the behavior of foreign governments, organizations, groups and individuals.

Strategic Effect. Disruption of the enemy's overall strategy, ability or will to wage war or carry out aggressive activity.

Systemic Effects. Effects on the operation of a specific system or systems. In essence, it answers the question to what degree has the system or systems been degraded or affected by those actions directed against it.

Unintended Effects. Unanticipated effect that could impact the campaign or have overall negative consequences. The destruction of the adversary's electric grid affects the command and control of his military operations, but also disrupts power to water treatment plants, which leads to increased levels of disease.